

22 24.(amended) A storage medium storing a control program for causing a computer to execute speech synthesis using phoneme data, said control program having:

code of a storage step of storing plural items of phoneme data;

code of a retrieval step of retrieving phoneme data, in accordance with given search retrieval conditions, from the plural items of phoneme data stored at said storage step;

code of a first penalty assigning step of assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved at said retrieval step;

35 code of a selection step of selection, from the phoneme data retrieved at said retrieval step, and based upon the penalty assigned at said first penalty assigning step, phoneme data employed in synthesis of a speech waveform;

code of an alternate retrieval step of retrieving phoneme data that satisfies some of the conditions in a case where phoneme data that conforms to the retrieval conditions at said retrieval step does not exist;

code of a counting step of grouping phoneme data, which has been retrieved at said alternate retrieval step, on the basis of a phoneme environment, and counting the items of phoneme data on a per-group basis; and

code of a second penalty assigning step of assigning a penalty on the basis of a count obtained at said counting step to the phoneme data retrieved at said alternate retrieval step, this penalty being assigned in addition to the penalty assigned at said first penalty assigning step.

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendments and the following remarks.

Claim Status

Claims 1-24 are pending in this application. Claims 1-7, 12-18 and 23 are rejected and claims 8-11, 19-22 and 24 have been objected to. Claims 1, 8, 9, 12, 19, 20, 23 and 24 are herein amended and claims 7 and 18 canceled without prejudice or disclaimer.

Claim rejections under §102(b)

Claims 1-5, 7, 12-16, 18 and 23 have been rejected under 35 USC. § 102(b) as being anticipated by Campbell et al. (GB 2313530) ("Campbell"). Claims 6 and 17 have been rejected under 35 USC §103 as being unpatentable over Campbell in view of Manwaring et al. (USP 6,188,984).

Claims 7 and 18 have been canceled rendering the rejections to those claims moot.

Amended claims 1, 12 and 23 have incorporated subject matter related to that recited in original claim 8, which was indicated as constituting allowable subject matter. Accordingly, Applicants believe that the amended claims 1, 12 and 23 are allowable for at least this reason.

Additionally, the independent claims are believed allowable because the invention recited, e.g., in claim 1 is characterized by assigning a power-related penalty in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value of the power, and assigning a phoneme-duration-related penalty in such a manner that a small penalty is assigned to phoneme data whose phoneme duration is close to an average value of the phoneme duration.

By virtue of this feature, the optimum phoneme data is selected, based on a penalty relating to power and a penalty relating to phoneme duration.

According to Campbell, an optimal speech unit can be determined based on a

target cost and a concatenation cost. The target cost represents an approximate cost of the difference from the target utterance of speech. The concatenation cost represents an approximate cost of discontinuity between adjacent speech units.

Manwaring teaches ranking phonemes of a retrieved sequence based on the type of phoneme.

In view of the foregoing, Applicants respectfully submit that the invention as recited in the independent claims 1, 12 and 23 is neither taught or suggested by the cited art, taken alone or in combination, and is patently distinct from the art of record and therefore allowable.

Applicants believe the dependent claims which depend from independent claim 1, 12 and 23 are allowable for at least similar reasons as for the independent claims from which they depend. As such, Applicants have not individually addressed the rejections of the dependent claims but reserve the right to do so should such be necessary.

Allowable Subject Matter

Claims 8-11, 19-22 and 24 are objected to as being dependent upon a rejected base claim but indicated as being allowable if rewritten in independent form including all limitations of the base and intervening claims. Claims 8, 9, 19, 20 and 24 have been so amended to be independent in form. Accordingly, Applicants submit that these amended claims and claims 10, 11, which depend from claim 9, and claims 21 and 22, which depend from claim 20, are hereby also in condition for allowance.

Accordingly, Applicants respectfully submit that this application is in condition for allowance, which action is respectfully requested.

AUTHORIZATION

Should any additional fees be required for this Amendment, the Commissioner is hereby authorized to charge any such additional fees, or credit any overpayment to Deposit Account No. 13-4500, Order No. 1232-4563.

In the event that a telephone conference would facilitate prosecution of the instant application in any way, the Examiner is invited to contact the undersigned at the number provided.

An early and favorable examination on the merits is respectfully requested.

Respectfully submitted,

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AMENDMENTS TO CLAIMS 1, 8, 9, 12, 19, 20, 23 and 24

1.(amended) A speech synthesizing apparatus comprising:
storage means for storing plural items of phoneme data;
retrieval means for retrieving phoneme data, in accordance with given retrieval conditions, from the plural items of phoneme data stored in said storage means;
first penalty assigning means for assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved by said retrieval means; and
selection means for selecting, from the phoneme data retrieved by said retrieval means, and based upon the penalty assigned by said first penalty assigning means, phoneme data to be employed in synthesis of a speech waveform,
wherein the attribute values include power and phoneme duration of each item of phoneme data, and
said first penalty assigning means assigns a power-related penalty in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value of the power, and assigns a phoneme-duration-related penalty in such a manner that a small penalty is assigned to phoneme data whose phoneme duration is close to an average value of the phoneme duration.

8.(amended) T[he apparatus according to claim 1,]A speech synthesizing apparatus comprising:
storage means for storing plural items of phoneme data;
retrieval means for retrieving phoneme data, in accordance with given retrieval conditions, from the plural items of phoneme data stored in said storage means;

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first penalty assigning means for assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved by said retrieval means; and

selection means for selecting, from the phoneme data retrieved by said retrieval means, and based upon the penalty assigned by said first penalty assigning means, phoneme data to be employed in synthesis of a speech waveform,

wherein said first penalty assigning means:

sorts the items of phoneme data in order of decreasing power and assigns a power-related penalty on the basis of the order obtained by sorting, in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value; and

sorts the items of phoneme data in order of decreasing phoneme duration and assigns a phoneme-duration-related penalty on the basis of the order obtained by sorting, in such a manner that a small penalty is assigned to phoneme data whose phoneme duration is close to an average value.

9.(amended) [The apparatus according to claim 1, further comprising:] A speech synthesizing apparatus comprising:

storage means for storing plural items of phoneme data;

retrieval means for retrieving phoneme data, in accordance with given retrieval conditions, from the plural items of phoneme data stored in said storage means;

first penalty assigning means for assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved by said retrieval means;

selection means for selecting, from the phoneme data retrieved by said retrieval means, and based upon the penalty assigned by said first penalty assigning means, phoneme data to be employed in synthesis of a speech waveform;

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alternate retrieval means for retrieving phoneme data that satisfies some of the retrieval conditions in said retrieval means does not exist;

counting means for grouping phoneme data, which has been retrieved by said alternate retrieval means, on the basis of a phoneme environment, and counting the items of phoneme data on a per-group basis; and

second penalty assigning means for assigning a penalty on the basis of a count obtained by said counting means to the phoneme data retrieved by said alternate retrieval means, this penalty being assigned in addition to the penalty assigned by said first penalty assigning means.

12.(amended) A speech synthesizing method comprising:

a storage step of storing plural items of phoneme data;

a retrieval step of retrieving phoneme data, in accordance with given search retrieval conditions, from the plural items of phoneme data stored at said storage step;

a first penalty assigning step of assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved at said retrieval step; and

a selection step of selecting, from the phoneme data retrieved at said retrieval step, and based upon the penalty assigned at said penalty assigning step, phoneme data employed in synthesis of a speech waveform,

wherein the attribute values include power and phoneme duration of each item of phoneme data, and

in the first penalty assigning step, a power-related penalty is assigned in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value of the power, and a phoneme-duration-related penalty is assigned in such a manner that a

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small penalty is assigned to phoneme data whose phoneme duration is close to an average value of the phoneme duration.

19.(amended) [The method according to claim 18,] A speech synthesizing method comprising:

a storage step of storing plural items of phoneme data;

a retrieval step of retrieving phoneme data, in accordance with given search retrieval conditions, from the plural items of phoneme data stored at said storage step;

a first penalty assigning step of assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved at said retrieval step where a penalty is assigned using power and phoneme duration of each item of phoneme data as the attribute value; and

a selection step of selecting, from the phoneme data retrieved at said retrieval step, and based upon the penalty assigned at said penalty assigning step, phoneme data employed in synthesis of a speech waveform,

wherein said first penalty assigning step:

sorts the items of phoneme data in order of decreasing power and assigns a power-related penalty on the basis of the order obtained by sorting, in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value; and

sorts the items of phoneme data in order of decreasing phoneme duration and assigns a phoneme-duration-related penalty on the basis of the order obtained by sorting, in such a manner that a small penalty is assigned to phoneme data whose phoneme duration is close to an average value.

20.(amended) [The method according to claim 12, further comprising:] A speech synthesizing method comprising:

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a storage step of storing plural items of phoneme data;

a retrieval step of retrieving phoneme data, in accordance with given search
retrieval conditions, from the plural items of phoneme data stored at said storage step;

a first penalty assigning step of assigning a penalty that is based upon an attribute
value to each item of phoneme data retrieved at said retrieval step;

a selection step of selecting, from the phoneme data retrieved at said retrieval step,
and based upon the penalty assigned at said penalty assigning step, phoneme data employed in
synthesis of a speech waveform;

an alternate retrieval step of retrieving phoneme data that satisfied some of the
retrieval conditions in a case where phoneme data that conforms to the retrieval conditions at
said retrieval step does not exist;

a counting step of grouping phoneme data, which has been retrieved at said
alternate retrieval step, on the basis on a phoneme environment, and counting the items of
phoneme data on a per-group basis; and

a second penalty assigning step of assigning a penalty on the basis of a count
obtained at said counting step to the phoneme data retrieved at said alternate retrieval step, this
penalty being assigned in addition to the penalty assigned at said first penalty assigning step.

23.(amended) A storage medium storing a control program for causing a
computer to execute speech synthesis using phoneme data, said control program having:

code of a storage step of storing plural items of phoneme data;

code of a retrieval step of retrieving phoneme data, in accordance with given
search retrieval conditions, from the plural items of phoneme data stored at said storage step;

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code of a first penalty assigning step of assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved at said retrieval step; and

code of a selection step of selection, from the phoneme data retrieved at said retrieval step, and based upon the penalty assigned at said first penalty assigning step, phoneme data employed in synthesis of a speech waveform,

wherein the attribute values include power and phoneme duration of each item of phoneme data, and

in the first penalty assigning step, a power-related penalty is assigned in such a manner that a small penalty is assigned to phoneme data whose power is close to an average value of the power, and a phoneme-duration-related penalty is assigned in such a manner that a small penalty is assigned to phoneme data whose phoneme duration is close to an average value of the phoneme duration.

24.(amended) [The storage medium according to claim 23, wherein said control program further has:] A storage medium storing a control program for causing a computer to execute speech synthesis using phoneme data, said control program having:

code of a storage step of storing plural items of phoneme data;

code of a retrieval step of retrieving phoneme data, in accordance with given search retrieval conditions, from the plural items of phoneme data stored at said storage step;

code of a first penalty assigning step of assigning a penalty that is based upon an attribute value to each item of phoneme data retrieved at said retrieval step;

code of a selection step of selection, from the phoneme data retrieved at said retrieval step, and based upon the penalty assigned at said first penalty assigning step, phoneme data employed in synthesis of a speech waveform;

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code of an alternate retrieval step of retrieving phoneme data that satisfies some of the conditions in a case where phoneme data that conforms to the retrieval conditions at said retrieval step does not exist;

code of a counting step of grouping phoneme data, which has been retrieved at said alternate retrieval step, on the basis of a phoneme environment, and counting the items of phoneme data on a per-group basis; and

code of a second penalty assigning step of assigning a penalty on the basis of a count obtained at said counting step to the phoneme data retrieved at said alternate retrieval step, this penalty being assigned in addition to the penalty assigned at said first penalty assigning step.

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